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[redacted]

Dr. W.F. Libby
U.S. Atomic Energy Commission
1901 Constitution Avenue
Washington 25, D.C.

Dear Dr. Libby:

The other day I discussed with Dr. Rabi the question of declassification of SUNSHINE and of the fall-out results from our tests.

As you will remember we all agreed at the RAND meeting in Summer 1953 that it would be highly desirable to declassify a large part of project SUNSHINE. I still feel the same way about this, and I think the arguments for declassification have become far stronger than they were in 1953. There is real unrest both in this country and abroad concerning the long-range as well as short-range radioactivity, and it would, in my opinion, greatly allay the fears of the public if the truth were published. I believe the story of SUNSHINE could be published without giving away <u>any</u> information about our H-bombs; it is merely necessary to put the permissible accumulated yield in terms of fission yield rather than total yield.

Another question is the publication of the fall-out data from our tests. I think it would be highly desirable to publish these too, in particular for civil defense purposes. However, in this connection, Rabi tells me that you are concerned that we might by such publication reveal some features of the design of our H-bombs.

In order to see to what extent this might be the case, I have asked Dr. Philip Morrison to write up his own conclusions from the published newspaper reports on the fall-out from our test of March 1, 1954. Dr. Morrison, as you know, has no access to any classified information. His conclusions are enclosed.

You will note that the fission yield which he calculates for our March 1 test is only 0.2 megatons. With his assumptions I might get twice this yield, but this does not change the general conclusion. His conclusion is essentially that a fission bomb was only used as a trigger of the thermonuclear weapon. Just why the fall-out data give this result I do not know; apparently the fall-out, at least at distances of 100 to 300 miles, is only a small fraction of the total fission yield of the bomb.

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Therefore, it seems to me that a publication of the fall-out data would not reveal the design of our E-bomb in any way, even if the absolute fall-out were given. Moreover, the data could be published giving only relative fall-out as a function of distance. Finally, as Morrison's report shows, it seems to be easy to draw entirely wrong conclusions from the fall-out data.

I believe it would greatly improve international feeling about our Pacific tests if we were to publish the correct story of SUNSHINE and of fall-out.

Yours sincerely,

H. A. Bethe

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HAB:pm

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RESTRICTED DATA
[redacted]

SECRET
SECURITY INFORMATION

FISSION ENERGY IN IVY (Bikini, March 1954) [redacted]

Reading the New York Times and the Bulletin, one can conclude that Sr^{90} was the main activity found on the decks of the Fortunate Dragon. This leads clearly to the hypothesis that most activity even the first day was fission product. An accurate estimate of the amount present is not easy, but a lower limit seems rather easy. That it is a lower limit follows from the exposure of the Marshallese on Rongerik, which was much further away. It is very improbable that a tiny patch of extra activity hit both the fisherman and Rongerik.

For the fishermen: Since one out of a fair number died, we can guess about 200 rep dose accumulated. Using the tables and data in THE EFFECTS OF AW, we get:
200 r accumulated after 3 hours after explosion. Fig. 8.17 implies
30 r/hr at 1 hour after explosion.

For 30 r/hr, Fig. 8.33 gives about 10 Megacuries/mi^2, taking height above ground between 3 and say 6 or 8 feet (deck plus sea). Since they moved out of contaminated sea, presumably it should mostly be from deck, which would give a rather large factor of increase. This suggests that the sea contamination was spread over a distance large enough so that they did not move out until after several hours.

The area contaminated is at least 70 miles by 3 or 4 miles, from the minimum diameter of fire ball. Notions of winds, and evidence of above paragraph, plus diffusion on way down from upper air, allows a conservative increase to 70 by 20 miles, say very modestly, 1000 mi^2 with the dose as given.

Using the fall-out data of Table 8.68, and remembering this was a bigger bang but the fall-out was of larger material, suggests again that the area is still bigger, and allows the very rough guess that one-third or less of the stuff was out at this time. A total activity of some 3×10^4 megacuries at one hour implies 5 nominal bombs, or 0.1 megaton. This is likely to be a lower limit.

Taking the Rongerik data, they got say 50 r total beginning at 5 or 6 hours, but nearly 300 miles away. This implies a dose of 2 megacuries per mi^2, over maybe 15,000 square miles (300 x 50), reduced to the 1 hour after explosion activity. The fall-out is somewhat greater now, so we get a total of say 6×10^4 megacuries at 1 hr, or 10 nominal bombs, say 0.2 megatons of fission energy. The agreement is good and allows one to blame the Fortunate Dragon high exposure on a wide area rather than on a fluke.

I would guess that the IVY shot contained at least 0.2 and perhaps as much as two or three times that of fission megatons. Probably this was the trigger and not an additive to enhance activity.

Philip Morrison
December 11, 1954